Box 795 Highway 161
Bessemer City, NC 28016

CERTIFIED MAIL

Friday, March 08, 2002

Administrator
US Environmental Protection Agency
P.O. Box 1473
Merrifield, VA 22116
Attention: Chemical Right-to-Know

Also sent to e-mail addresses: oppt.ncic@epa.gov, chem.rtk@epa.gov, heftner.richard@epa.gov

Registration Number:

Dear Administrator Whitman:

FMC Corporation actively supports the EPA HPV Challenge Program, AR-201, and is pleased to submit the protest test plan and robust summary for the chemical:

- Butyllithium -- CAS No. 109-72-8

This submission includes an electronic copy of this cover letter and a report in Microsoft Word 2000 format. IUCLID format was not prepared, due to the fact that very little data exists or can be obtained on butylithium, a pyrophoric and corrosive substance that reacts violently under most study conditions. I discussed the report format with Richard Hefner of the HPV Chemicals Branch, and he suggested this approach. Please contact me if you have any comments or questions regarding this submission.

Sincerely,

Helen Hatch
Product Regulations Specialist
FMC Lithium Division
Phone: 704-868-5309
Fax: 704-868-0800

AR201-13633A

High Production Volume (HPV) Chemical Challenge Program

Test Plan

For

Butyllithium

CAS No. 109-72-8

Submitted by:

FMC Lithium Division
Highway 161 Box 795
Bessemer City, NC 28016

Date:

n-Butyllithium HPV Test Plan

Plain English Summary

FMC Corporation Lithium Division is sponsoring the chemical, n-butyllithium (CAS: 109-72-8, also called butyllithium). Butyllithium is used as an initiator for polymerization in the production of automobile tires. It has specialized applications in the synthesis of pharmaceuticals.

Butyllithium is extremely reactive with air and moisture and would not exist for any significant time in the ambient air. Butyllithium solutions are pyrophoric, and catch fire if open to the air. Decomposition products are generally butane gas and corrosive hydroxide salts. It must be stored and handled in sealed systems under inert gas to prevent loss of activity. Butyllithium solutions are completely consumed in the manufacturing processes that use it. No trace is present in the final manufactured tire, pharmaceutical or other final product.

Due to the highly reactive and pyrophoric properties of butyllithium and the manner in which is stored and handled, exposure to humans or the environment is unlikely, except in cases of accidental release. In the event of an accident or spill the product will react quickly with air or moisture and burn, consuming the butyllithium entirely.

Most studies on the toxicity and chemical and physical properties of butyllithium cannot be conducted according to accepted protocols due to its pyrophoric properties. Study procedures that do not exclude air and moisture would not produce meaningful data and are of no value. Butyllithium reacts violently on exposure to aquatic systems and animal tissues, releasing flammable butane and corrosive hydroxide salts. Exposure of butyllithium to test animals would be cruel and inhumane and would not generate meaningful data as the test animals would most likely have to be sacrificed for humane reasons long before the study concluded. Thus, there is little existing data on butyllithium to submit as part of the HPV programs and no robust summaries will be accompanying this test plan.

Information can be provided on some the SIDS data points and the test plan summarize available data on each one.

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AR201-13633B

SIDS Endpoints:
Review of Existing Data and Development of Test Plan Rational

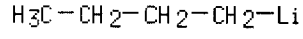
1. GENERAL INFORMATION

[1.01 A.] CAS-number: 109-72-8

[1.01 C.] Name of the Substance: n-Butyllithium
Synonyms:
Lithium, butyl-
Butyllithium
1-Butyllithium
Lithium, butyl- (8CI, 9CI) (CA INDEX NAME)
EINECS No.: 203-698-7

[1.01 D.] CAS-descriptor: Not applicable

[1.01 G.] Structural Formula
The CAS file shows the following structure



[1.5] Quantity

Annual worldwide production and consumption of butyllithium and other organolithiums is 4 million pounds (1800 metric tones).[1]

[1.7] Use Pattern

Butyllithium reacts violently with air or water and is rarely used in its pure state. For safety and ease of use, butyllithium is diluted in hydrocarbon solvent and typical concentrations are15-30% weight percent. Even when in a diluted state, butyllithium solutions are extremely reactive with air and are pyrophoric (spontaneously combustible). Butyllithium solutions are handled in sealed, inert gas systems and the utmost care taken to prevent environmental release or contamination from contact with air.

If butyllithium spills or otherwise comes in contact with ambient air, it decomposes almost immediately to form lithium hydroxide and butane. Precautions must be taken to prevent fire and prevent exposure to decomposed solutions, which are corrosive and flammable. Recommended cleanup measures minimize the possibility of exposure to skin or eyes. Recommended personal protection equipment for handling and spills includes chemical splash goggles with a face shield, rubber gloves, and rubber clothing.

Butyllithium is commonly used as an initiator for anionic polymerization in the manufacture of automobile tires. Some Butyllithium is used in organic synthesis to manufacture drugs and drug intermediates. It is handled in sealed systems under inert gas. Butyllithium is completely

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[1] Weissenbacher, M., Anderson, E., Ishikawa, Y.; "Organometallics", July, 1998, page 681.7002T Chemical Economics Handbook-SRI International

consumed in the manufacturing process and no residual amount is present in the end products. Butyllithium is not present in consumer products.

[1.9] Sources of Exposure

Butyllithium is handled in closed systems under inert gas, and it is unlikely that exposure would occur. Sources of exposure would be limited to accidental spills, as might occur in an industrial process or in a transportation accident. Small releases would react immediately with air or moisture, forming butane and lithium hydroxide before it could come in contact with anyone in the surrounding area. Waste butyllithium would be chemically treated to hydrolyze it and neutralize the corrosive residue. Organic components of the waste would be burned for fuel. Human or environmental exposure is unlikely except in the case of an accident, in which case the resulting fire would consume the butyllithium. Accident response normally concentrates on controlling the effects of fire and heat on the surrounding area, and fires may be left to burn out on their own.

2. PHYSICAL-CHEMICAL DATA

[2.3] Density (Relative Density)

Densities of Commercially Available Butyllithium Solutions

n-Butyllithium formulation	density	Ref
n-Butyllithium 24.0 % in Isopar C	0.707 g/ml (5.90 lb/gal) @ 20°C	FMC Lithium data sheet
n-Butyllithium 15 % in hexane	0.76 g/ml (6.34 lb/gal) @ 20°C	FMC Lithium data sheet
n-Butyllithium 25.0 wt. % in heptanes	0.72 g/ml (6.01 lb/gal)	FMC Lithium data sheet
n-Butyllithium 24% in heptane	0.697 g/cc	1. Kamienski; Esmay, J.Org.Chem., 25 1960, 115,119,120, CODEN: JOCEAH

The following physical property information is not available, and it is not practical to run the studies according to given protocols because butyllithium and butyllithium solutions are pyrophoric. Any study procedure that does not exclude air and moisture would not produce meaningful data and is of no value.

[2.1] Melting Point [2]
[2.2] Boiling Point
[2.4] Vapour Pressure
[2.5] Partition Coefficient (n-Octanol/water)
[2.6. A.] Water Solubility
[2.6.B.] pH Value and pKa Value
[2.12] Oxidation-Reduction Potential
[2.13 A.] Adsorption/ Desorption to Soil

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[2] The melting point of Butyllithium is less than 0 °C. Pure butyllithium is a liquid. In commercial formulations the solvent properties control the melting point.)

3. ENVIRONMENTAL FATE AND PATHWAYS

The following environmental studies cannot be conducted on butyllithium because it is pyrophoric. Any study procedure that does not exclude air and moisture would not produce meaningful data and is of no value. Butyllithium reacts violently with water to form butane and lithium hydroxide. Butane is a HPV chemical already supported by the American Petroleum Institute (API) Petroleum HPV Testing Group, and American Chemistry Council (ACC) Olefins Panel HPV Work Group.[3] Lithium hydroxide may raise the pH of aquatic systems.

[3.1.1] Photodegradation
[3.1.2] Stability in Water (Hydrolysis)
[3.2] Monitoring Data (Environment)
[3.3] Transport and Distribution between Environmental Compartments including Estimated Environmental Concentrations and Distribution Pathways
[3.5] Biodegradation

4. ECOTOXICITY, and 5. TOXICITY

Studies to determine the ecotoxicity and animal toxicity cannot be performed on butyllithium because of its reactivity and corrosive properties. Butyllithium is pyrophoric and would react violently on exposure to aquatic systems and animal tissues, releasing flammable butane and corrosive lithium hydroxide, and likely starting a fire. Exposure of butyllithium to test animals would be cruel and not generate meaningful data as the test animals would most likely have to be sacrificed for humane reasons long before the study concluded. In fact, the use of any test method where water and air is not excluded is of no value.

Experiences with human exposure (item 5.11 of the SIDS data set) can be provided, and is included below.

4. ECOTOXICITY
[4.1] Acute/Prolonged Toxicity to Fish
[4.2.A] Acute Toxicity to Aquatic Invertebrates (Daphnia)
[4.3] Toxicity to Aquatic plants e.g. Algae
[4.5.2] Chronic Toxicity to Aquatic Invertebrates (Daphnia)
[4.6] Toxicity to Terrestrial Organisms
5. TOXICITY
[5.1] Acute Toxicity
[5.4] Repeated dose Toxicity
[5.5] [5.6] Genetic Toxicity in vitro and in vivo
[5.7] Toxicity to Reproduction
[5.8] Developmental Toxicity/Teratogenicity

[5.11] Experiences with Human Exposure (Work Place Exposure)

Butyllithium is used in closed systems under an inert atmosphere and human exposure is rare.

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[3] See entry under butane, CAS No. 106978, on the EPA website address: http://www.epa.gov/oppt/chemrtk/opptsrch.htm.

No concentrations of butyllithium would be present in the work place because it reacts immediately with air or ambient moisture to form butane and lithium hydroxide. It is consumed completely in the industrial manufacturing processes in which it is used and is not present in the final product. Therefore, there is no exposure from use of final product.

In cases where workers might be exposed to butyllithium or decomposed butyllithium solutions, the MSDS recommends splash goggles with a face shield, rubber gloves, and rubber clothing.